



science  
& technology

Department:  
Science and Technology  
REPUBLIC OF SOUTH AFRICA

SOUTHERN AFRICAN JUNIOR MATHEMATICS OLYMPIAD

FEMSISA MATHEMATICS OLYMPIAD

(SAJMO)

GRADE EIGHT

DATE: 12 OCTOBER 2017

FINAL ROUND

TIME: 120 MINUTES

Instructions:

1. This booklet has 20 questions.
2. Use the answer sheet provided. Enter your answer in the block.
3. All working details must be done in the space provided.
3. Calculators are not permitted..
4. Diagrams are not necessarily drawn to scale.
5. The first 15 problems carry one mark each and the next 5 carry 2 marks each.
6. You have 120 minutes for the paper which works out to an average of 6 minutes per question.
7. Read the questions carefully before answering.



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*REGISTRATION NO: 2015/050119/08*

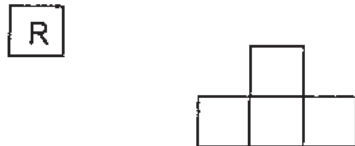
FEMSSISA Grade 8 Final Round 2017

1. Write down the expression that 'a' stands for:-  
 $9x^3 - 6x = a(3x^2 - 2)$
2. Find the value of  $4x^3 - 3x$  when  $x = -2$
3. The sum of 3 consecutive even numbers is t. Write down the smallest number in terms of t.
4. If the difference of half an angle's supplement and the angle's complement is  $15^\circ$  then find the angle.
5. Two fractions *a* and *b* are equally spaced with the other two fractions  $\frac{1}{4}; a; \frac{3}{8}; b$  Find  $a + b$ .
6. If  $\frac{3}{a} + \frac{b}{6} = \frac{13}{24}$  and  $a:6 = 4:3$  then find the value of b.
7. Give the remainder when  $3^{206}$  is divided by 10
8. Determine the 3<sup>rd</sup> number of the 21<sup>st</sup> row:-  
4  
6      8  
10    12    14  
16    18    20    22  
.....
9. Find the sum of the digits  
 $\frac{4444\dots4444 \text{ (40 digits)}}{2222\dots2222 \text{ (20 digits)}} \times \frac{2222\dots2222 \text{ (30 digits)}}{4444\dots4444 \text{ (30 digits)}}$
10. Find the value of:-  
 $4 - 6 + 8 - 10 + \dots - 102 + 104$

11. 16 litres of a 30 litre container has 40 % concentrate. How many litres of water is needed to reduce the concentrate to 35%?

12. Symmetry

What is the maximum number of lines of symmetry does the figure below have if R can be attached to create alternate figures.



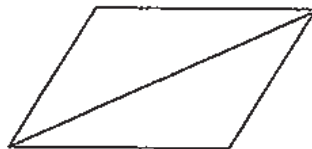
13. Amy is 10 years older than Bunny. If Bunny was 5 years younger then she would have been half as old as Amy. What is Amy's age?

14. Find the smallest natural number which when multiplied by 20 will become a perfect square but when multiplied by 50 will become a perfect cube.

15. What is the first time after 2 o' clock will the minute hand and the hour hand form an angle of  $49^\circ$ .

16. Matchsticks

36 equal sized matchsticks are used to construct the rhombus below including the longer diagonal. All the matchsticks are used for the construction of the rhombus. How many such rhombuses are possible?



17. Evaluate

$$\frac{1}{5 \times 9} + \frac{1}{9 \times 13} + \frac{1}{13 \times 17} + \dots + \frac{1}{37 \times 41}$$

18. For what integral value of  $n$  the following expression will have highest value?

$$\frac{10n-4}{n-4}$$

19. 125 one cm cubes with all white faces are used to form one large cube. 4 of the faces were painted green except of 1 pair of opposite faces. These cubes were dismantled. How many cubes have at least 2 green faces?

20. Arrange the following 4 fractions from lowest to highest.

$$\frac{23}{28}, \frac{19}{23}, \frac{13}{16}, \frac{9}{11}$$

$$\begin{aligned} \text{TOTAL: } 15 \times 1 &= 15 \\ 5 \times 2 &= 10 \end{aligned}$$

25
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